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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/912,166	07/24/2001	Jorg Lahann	MIT9151	3967
7590 06/28/2004			EXAMINER	
Samuels, Gauthier & Stevens LLP			CHACKO DAVIS, DABORAH	
Suite 3300			ART UNIT	
225 Franklin Street			PAPER NUMBER	
Boston, MA 02110			1756	

DATE MAILED: 06/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/912,166	Applicant(s) LAHANN ET AL.	
	Examiner Daborah Chacko-Davis	Art Unit 1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2 is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6,7,9,13,14,21,24-30 and 32 is/are rejected.
- 7) ☒ Claim(s) 5,8,10-12,15-20,22-23, and 31 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 1, 3, 6-7, 13-14, 21, 24-28, and 32, are rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No. 5,869,135 (Vaeth et al).

Vaeth, in the abstract, in col 3, lines 53-65, in col 4, lines 1-15, and lines 23-46, discloses a chemical vapor deposition wherein the coating (polymeric) has sufficient intrinsic reactivity (the monomer is sublimated to reactive monomer vapor) to react with target molecules (carrier gas molecules), wherein the deposited monomers (have sufficient intrinsic reactivity) are then subjected to a subsequent chemical process (chemical reactivity to react with target molecules) so as to polymerize the monomers (claim 1). Vaeth, in col 4, lines 23-46, discloses that the interfaces (coatings) are based on co-polymers (condensation polymerization occurs at the substrate surface) (claim 3). Vaeth, in col 4, lines 10-11, lines 23-46, and in col 5, lines 29-61, discloses that the polymeric coating contains functional groups (monomer in the bath) that react with functional groups (monomer vapor in the carrier gas) in the presence of electromagnetic radiation resulting in stable linkages (the monomers polymerize to form polymers) (claims 6-7). Vaeth, in col 5, lines 30-52, discloses that the polymeric coating is applied in the form of a pattern on the substrate (claim 13). Vaeth, in col 4, lines 4-7, in col 5,

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lines 18-20, discloses that the monolayer is microstructured by stamping the monolayer deposited on the substrate to form a pattern (claim 14). Vaeth, in col 3, lines 53-65, and in col 4, lines 13-15, discloses that the patterning of the polymeric layer is performed using layer-by-layer adsorption (different regions of the substrate adsorb differently) (claim 21). Vaeth, in col 4, lines 9-12, discloses that the substrate is selectively exposed to plasma prior to the deposition process (claim 24). Vaeth, in col 4, lines 10-15, and lines 35-46, and in col 5, lines 40-53, discloses that the chemical groups (monomers and precursors) of the coating to be formed have intrinsic reactivity to react with the carrier gas molecules and the coating formed on the substrate is distributed anisotropically (pattern formed on the substrate) (claim 25). Vaeth, in col 4, lines 23-33, discloses that a gradient of reactivity is formed after pyrolysis in the CVD chamber prior to deposition such that two different types of chemical groups (reactive monomer, and an intermediate monomer) have sufficient reactivity to react with carrier gas prior to deposition (claims 26-27). Vaeth, in col 3, lines 59-65, and in col 4, lines 23-45, discloses that the polymeric coating comprises at least one polymer that have sufficient reactivity and at least one polymer that has lesser affinity to reactivity (claim 28). Vaeth, in col 2, lines 1-29, discloses that the coating includes functional groups (precursors) that enhances surface properties (claim 32).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4, 9, and 29-30, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,869,135 (Vaeth et al) in view of U. S. Patent No. 6,291,072 (Kimoto et al).

Vaeth is discussed in paragraph no. 4.

The difference between the claims and Vaeth is that Vaeth does not disclose that [2,2] paracyclophanes are polymerized during the chemical vapor deposition process (claim 4). Vaeth does not disclose that [2,2] paracyclophane is deposited by i) purifying the [2,2] paracyclophane, ii) sublimating the [2,2] paracyclophane under a reduced pressure of less than 100 Pa, iii) heating the sublimated material to approximately 550°C - 900°C to cleave the C-C bonds to form the monomers, and iv) polymerizing the monomers that are absorbed on the substrate at a temperature below 150°C to produce a topologically uniform polymer film (claim 9). Vaeth does not disclose that the polymer with insufficient intrinsic reactivity to react with target molecules is a functionalized poly (p-xylylene) (claims 29-30)

Kimoto, in col 3, lines 26-67, in col 4, lines 1-2, in col 6, lines 66-67, and in col 7, lines 1-45, discloses that the [2,2] paracyclophane is polymerized in a LPCVD chamber by a) purifying [2,2] paracyclophanes (by separation method), b) sublimating the [2,2] paracyclophane in an evaporation chamber subjected to a pressure of about 6 Pa, c) heating the sublimated material in a decomposition chamber at a temperature of about 750°C to produce monomers, and d) polymerizing the coating formed on the sample

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placed on the susceptor at a temperature of about 60°C resulting in a dense insulating film. Kimoto, in col 2, lines 64-67, and in col 3, lines 1-49, discloses that the polymeric interface formed on the substrate is a functionalized poly-xylylene and that it has insufficient intrinsic reactivity towards the target molecules (carrier gas in the chamber).

Therefore, it would be obvious to modify Vaeth by using [2,2] paracyclophane as the starting material in the CVD chamber to form a uniform film (non-reactive poly xylylene) of the sublimated and polymerized monomers as taught by Kimoto because Vaeth, in col 4, lines 1-46, teaches the sublimation, heating and decomposition of polymeric material to form monomers that are subsequently deposited by a CVD process on a substrate and later polymerized, and Kimoto, in col 4, lines 15-36, discloses that employing such a method results in a film with excellent gap fill properties, lesser water adsorption, and a strong adhesion to metallic conductive layer.

Allowable Subject Matter

5. Claim 2 is allowable over the prior art of record (U. S. Patent No. 5,869,135 (Vaeth et al) and U. S. Patent No. 6,291,072 (Kimoto et al)) because the prior art of record fails to disclose a CVD process performed to form a reactive coating on the substrate wherein the reactive coating includes repeating units recited in claim 2.

6. Claims 5, 8, 10-12, 15-20, 22-23, and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

7. Applicant's arguments filed on May 20, 2004, have been fully considered but they are not persuasive. The 102 and 103 rejections made over claims 1, 3-4, 6-7, 9, 13-14, 21, 24-30, and 32 are maintained.

A) Applicants argue that Vaeth's system produces commercial coatings that are found to deposit anisotropically on certain substrates, whereas the present invention results in polymer films that have a uniform thickness along the entire film, and the present invention does not disclose any kind of selective deposition.

Vaeth, in col 4, lines 1-3, discloses that the chemical vapor deposition process can also be used to produce a uniform coating (not selective deposition) of an organic precursor on the substrate. Additionally, the claim recites that the deposited coating formed is applied as a pattern on the substrate, i.e., selective chemical vapor deposition of the polymer coating to form a pattern on a substrate.

B) Applicants argue Vaeth does not disclose that the deposited polymer films formed are chemically reactive and support chemical reactions at the surface of the coating subsequent to the CVD step.


Vaeth, in col 4, lines 43-46, discloses the chemical vapor deposition of monomers (with sufficient reactivity) on the surface of a substrate followed by a chemical reaction (polymerization, at a later processing) to form polymer layers. Additionally, Vaeth, in col 5, lines 1-5, and lines 40-61, discloses that the deposited polymeric film possesses intrinsic reactivity, and that the deposited polymer films are subjected to subsequent chemical reactions.

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Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd


June 24, 2004.


JOHN A. MCPHERSON
PRIMARY EXAMINER